INTERACTIVE TELECOMMUNICATION SYSTEMS USED BY ARTISTS

Introduction

There are four basic types of system which have been used:

1. The normal telephone (for audio transmission)
2. Slow-scan TV (SSTV)
3. Telefax, also known as facsimile transmission or fax
4. Computer networking (for text transmission)

The use of each of these will be described, and then a comparison made. Other possibilities will be briefly discussed, including videotex, a computerised visual networking medium, and two-way video. Finally, a possible future scenario for artists' involvement with telecommunications will be proposed.

Types of system available

1. The basic telephone

The simplest method of telecommunication, and the one which is the most widely available, is the normal telephone. It is important to note that, as commonly understood, the telephone consists of a transmitter/receiver for speech, the handset, connected to a line, or cable link. The latter provides a channel of communication which can also be used for other, digital forms of transmission. (However, in practice, a second telephone line for verbal coordination is generally desirable when operating visual media such as slow-scan TV or telefax.)

When the telephone is used for normal voice transmission, it works in "real time", that is to say, the line must be kept open for the amount of time it actually takes to talk. This makes it quite expensive to use over long distances for lengthy exchanges. Nevertheless, it is the only globally available technology, and is therefore the most suitable medium for telecommunications art projects

which seek world-wide participation. Several points may be interconnected simultaneously via a conference call to form a network. For group situations, it may be convenient to use one of the many loudspeaker telephones available, which automatically sense voice levels and switch between "send" and "receive" modes. However, in a noisy situation, this can be unreliable, and the sound quality and maximum volume would also be inadequate. (One solution to this problem is offered by the Voca company. They make a loudspeaker receive-only attachment which still uses the normal handset for sending. There are also special conference systems available from Telecom, but the maximum number of participants is limited, and an audience would thus be excluded.)

Although the telephone system is designed for relaying speech, and consequently suffers from a restricted frequency response, some artists have used it to experiment with the exchange of audio works. The associated problems of addressing a large group were solved in the BLIX Telephone Music projects between eastern and western Europe (1983), by "hooking up" the telephone receiver to a public address system. This was done (illegally) by dismantling the telephone earpiece and connecting it to an amplifier. (To avoid problems of feedback into the telephone mouthpiece, the artists in Budapest kept the telephone in a room separate from the loudspeakers.)

2. Slow-scan Television (SSTV)

Slow-scan television equipment uses a computerised memory to sample a picture from a television camera every few seconds, "freeze" it and send it down a telephone line as an audio signal. (This takes approximately 8 - 60 secs depending on picture quality required. The early systems transmitted a black-and-white picture at 128 lines/screen resolution whereas the latest equipment operates at 256 or 512 line resolution in colour.) The machines can only be

used between two points at a time. At the receiving end, the signal is decoded and slowly scans out a still frame on a television monitor.

The result is a time-lapse series produced at intervals, like a very slow animation. The digital scan moves from the top to the bottom of the screen, line by line, and when the total image is scanned out, it is held until replaced by the next scan. Any interference shows up as a coarse line or lines in the middle of the picture. The technology is exclusively American, and the machines built by the various manufacturers, such as Robot Research, (San Diego, California) and Colorado Video, (Boulder, Colorado) are mutually incompatible. Although modems are not required, there may also be compatibility problems with the new digital telephone exchanges, necessitating additional custom-built telephone interfaces.

The latest machines have two memories, to facilitate interaction, and software is available to allow the digital image to be fed to a personal computer, manipulated through a "paintbox" program, then retransmitted. However, it is worth noting that any compatible personal computers which can accept a video camera input and run a "paint" program (such as the Macintosh) are inherently capable of communicating via telephone in a "slow-scan" mode. The locally-manufactured Fairlight CVI video synthesiser, which has inbuilt communication and sophisticated image-manipulation facilities, can also be used in this way. Like SSTV, such machines are restricted to point-to-point operation but they are slower (approx. 1 min. per picture) and much more complicated to operate. The lower transmitting speed means inherently higher phone costs, and a less dynamic interaction. None of the equipment with slow-scan capabilities has automatic dialling or answering facilities built-in, (except Macintosh Macterminals or equipment using other "smart" modems, such as Netcomm or

Avtek) nor is any of it compatible with other, similar equipment.

3. Telefax (facsimile or fax)

Telefax machines scan images on paper, transmit them down a telephone line and reproduce them in black and white at the other end. This takes about 30 seconds, depending on the detail in the original image. As with SSTV, the machines have no inherent networking capability, but are designed to work point-to-point. Because input can be in the form either of drawings, photocopies or handwritten messages, fax is inherently user-friendly. The printout can easily be displayed to large groups using noticeboards. The latest machines are highly automated and very easy to operate. Most allow several telephone numbers to be entered and stored. By pressing a button, a copy may be sent to one, or several destinations. It is not necessary for the person to be there to operate the receiving machine, which can be left connected and will accept incoming material automatically. It is also relatively easy to switch from fax to normal voice transmission on the one line for coordination purposes.

Telefax is a rapidly developing technology and machines can be expected to become extremely fast and flexible. Future developments promise to reduce transmission speeds to 4 seconds per page, at which point telefax operation will be cheaper than the postal service. Fax systems which operate in conjunction with a photocopier head and a computer laser printer are already on the market. There are also programs which allow fax machines to telecommunicate with computers and vice versa. Telefax is a ubiquitous, and therefore very accessible medium. The technology is readily available in most developed countries, from a number of different manufacturers, and many institutions already have machines. Unlike other communication technologies, most telefax machines operate on the same international transmission standards, although

some European countries, such as France, Spain and Italy, have a slightly different convention (which makes interaction difficult).

4. Computer networking

4.1 Introduction

Computer networking involves the transmission and reception of text using computer terminals linked to a central computer via the normal telephone. Terminals can either be purpose-built, like the portable Texas Instruments TI 745, which requires no programming and connects directly to a normal handset via rubber "cups", or general-purpose microcomputers like the Apple Macintosh and IBM PC machines. Most big libraries have a "dedicated" terminal which will operate on any network.

Computers used as terminals require considerable software setting-up, plus a modem for converting digital signals into telephone (audio) signals. However, if one uses the memory facilities, it is possible to save online costs by editing and composing offline. It is also possible to send existing disk files or save stuff to disk for editing and publication (Why didn't I do this years ago ? - The answer is that computer networking is a new medium where you really should interact with the incoming info. and reply immediately. The consequences of not doing so are, as mail artists have already discovered, a large mountain of junk mail which will eventually bury you - if you don't believe me, talk to American artists who were doing it 10 years ago!)

The simplest instances of computer networking are the local "bulletin board" services which computer clubs run. These allow members of a club to call a central computer to exchange messages and information stored on a central file. Nation-wide access to such systems can be created through the use of publicly-accessible telephone data

networks, such as the Australian Austpac service or the American Telenet service, which provide nationwide communication at a much lower cost than normal long-distance telephone calls. (Why isn't anybody doing this ?)

4.2 The I.P.Sharp "Artex" system (operating as "Artbox" prior to 1984)

I.P.Sharp Associates Pty.Ltd. provide a sophisticated, international computer network. A user needs only to make a local call within any of about 50 major cities, or alternatively, use a public-access telephone data network from any rural area, within the developed world. The call is routed via a system of "concentrator" computers, and leased telephone lines, to the central computer in Toronto. This process takes only a few seconds, and therefore permits a rapid exchange of information if another user happens to be on the system at the same time - or if this can be organised in advance. However, the system is basically intended to be "asynchronous", that is, the sender is free to "log-on" to the system at any time and from any place, and pick up messages addressed to him or her which are filed in Toronto; or send messages to anyone else who subscribes to the system. The central computer stores the messages until the recipient dials in. Messages are normally sent addressed to individuals, via a 3 - 5 letter code. However, group addresses can be created for special projects. Geographic location is not important, and the user can travel from place to place. S/he will always be identified by the code which has been allocated, and can still pick up messages. If users do not have their own equipment, they can use terminals at I.P.Sharp offices at no extra charge.

The Artex network operates on the "666 ECS" program as an artists' "special interest group" within Mailbox, one of the many I.P.Sharp software packages. It is very easy to operate, with a minimum of commands - like "SEND", "ANSWER", "HELP", and "STOP" - and there is a resident

troubleshooter on the network. The charges for use of the system are completely independent of distance and time of use, but are calculated on the number of words. Although there is no standing charge or joining fee, charges are levied on both transmitted and received messages. To send or receive a paragraph costs about $2, and artists'/institutional monthly billings average around $50. For information on how to join the network, see "HOW TO ACCESS THE 'ARTEX' NETWORK". There are about twenty regular Artex users worldwide - see "DIRECTORY OF ARTEX USERS".

4.3 Public-access networks currently available in Australia

In Australia, there is also a nationally-available Telecom electronic mail service known as Telememo, and an international, O.T.C.-run service, Minerva, which is compatible with telex and other overseas networks. These systems are similar in operation to the I.P.Sharp system, but not as cheap or simple to run. Telememo is intended to be a national service, and Minerva an international one; but in practice, Minerva can be used for both (and carries no initial fee or minimum charges), whereas Telememo cannot (and does require an initial fee and levies a minimum monthly charge). However, a new international service, Keylink, which will be compatible with both Telememo and Minerva, is being introduced by Telecom.

An interesting development in Telememo is AOLIN, a group of bulletin boards designed to connect colleges and educators together for mutual exchange of info and supported by Telecom, the NSW Dept. of Education and Deakin University.

4.4 The AOLIN network

The Australian Open learning Information network is a national, independent, network of people in tertiary and post-secondary institutions, schools, education

departments, libraries and business organisations who share a common interest in the use of information technology for teaching, research and administration. They communicate with one another via Telememo, and have access to a number of general and specialised bulletin boards which carry news and views on technological developments in education. There is also an ongoing computer "conference". The network could provide a primary communications network for artists involved in technology within Australia and we could establish our own bulletin board within the "umbrella" of AOLIN.

For membership application, write to Angela Castro, Deakin University, Victoria 3127. Registration is $20, Annual membership $50 plus normal Telememo charges (about $12/hr. connect time plus 2c/1000characters.)

System advantages, disadvantages and future prospects

The systems above can be categorised in a number of ways. Computer-based or telematic systems, and the ordinary telephone system, both have networking capabilities - that is to say, they are both capable of communication between a large number of points around the globe. SSTV and telefax, on the other hand, can only work point-to-point - or, between two places. However, the latter are both visual media, whereas telephones and most computer networks are not. (Nevertheless, SSTV may well be superseded by microcomputers, which will provide better image manipulation, and furthermore, will operate point-to-point on a commonly acceptable transmission standard.)

At present, the basic telephone is the only system which allows audio transmission. The quality is limited, but as telephone lines improve, and better types of loudspeaker and audio terminal become available, it will be possible to obtain the same quality over normal telephone lines as, say, AM radio. With ordinary telephones, there is no storage of information, and line costs are charged at the

full price. However, these limitations may well disappear when voice transmission "goes digital" in the near future. This may occur in conjunction with the introduction of videophones.

There is also the distinction between telematic systems, which use a central computer, and non-telematic systems. The former have the advantage of cheap, networking capabilities, because they do not need a long-distance line for the duration of a call. That is to say, they do not operate in real-time, but through a local "concentrator", which converts incoming data into "bursts", or "packets" of digital information. In addition, storage of data in a central memeory bank means that messages require no special scheduling, but are simply stored until the user accesses them. This is a great advantage with international work that crosses several time zones.

Computer networks do not generally have a visual facility, because pictures require the transmission and storage of a large amount of data (even more with colour). Nevertheless, simplified visual networks are now available. They are called videotex systems, and link the telephone, computer and television set into national networks in many developed countries. The largest system, Minitel in France, has over 3 million subscribers, followed by the second largest, the British Prestel system, on which the Australian Viatel system is based, with over 60,000 subscribers. (This information was provided by the British Consulate in Sydney, based on November 1985 figures). Unfortunately, the technology used in these systems is now several years old and very primitive, giving a poor visual display. However, with the introduction of optical fibre telephone lines, it seems certain that videotex networks will be potentially capable of exchanging high-quality visuals in the near future.

At the moment, videotex tends to be marketed as a centralised service for the distribution of information and advertising, rather than for interactive, public use. This is not a necessary corollary of the development of such systems, but rather, an economic and political decision. Whilst the Prestel, Minitel and Viatel systems incorporate a hierarchical approach to access, the Austrian "MUPID" system allows anyone to enter information and high-quality colour pictures into the central database at low cost, with the result that artists (such as the BLIX group) are able to create on-line "cartoon books" for public viewing. There is no doubt that in the future, the quality of videotex systems will improve, so that this new visual "storyboard" art, consisting of text and pictures, and formed from interactions between various artists, may also develop in other countries. The general public would have access to the process to view, interact with, and modify the work. However, the political barriers to democratic access which exist in many countries need to be removed. The systems also need to develop international compatibility.

In the future, there may be integrated transmission of voice and static pictures via videophones, which will be based on SSTV and microcomputer technology, and therefore relatively cheap to buy and operate. As telephone networks based on optical fibre transmission are installed in the near future, and at the same time, the "codec" technology, which is currently used for digital conversion of satellite television news broadcasts, becomes much cheaper, it will be feasible to transmit both high-quality moving video pictures, plus high-quality digital sound, over long distances via telephone lines. Like present forms of SSTV, this technology will still be limited to real-time, "live" exchanges between two centres, as computer networks will be unable to store economically the huge amounts of data being transmitted. It will, however, provide an accessible, two-way cable television system. If this technology is not to be set up in the same,

hierarchical fashion as previous networks, appropriate policies for dealing with such new communication possibilities need to be evolved by government, in consultation with the general public. (This particular issue is comprehensively dealt with in Ian Reinecke's book, Connecting You, Melbourne, McPhee Gribble (Penguin), 1985.)

The future of artists' telecommunication

The mass media has promoted a mechanistic model of communications, structured around centralised distribution of information and images, which suits a consumer-oriented society. However, with the emergence of cheap digital communications technology, the imperative to sit passively in front of a video screen, which has been articulated by Jean Baudrillard, is open to challenge. It is now possible to use electronic media in an interactive way.

One possibility for the future is that art and social life may merge, through the participatory activity of electronic networking, as components of a new, post-industrial lifestyle. Artists' work with telecommunications has already demonstrated its heterodoxy in the pluralistic span of works and participants it can engage, from writers to visual artists, academics, community artists, technical teachers, students and schoolchildren, who may democratically exchange and modify contributions in a dispersed, but interactive collaboration. (See Jan Birmingham "Art Communicates - O.K.!") However, there are problems in soliciting an art response from the general public, which arise from their lack of suitable training. A more likely scenario is that, like audio and video art, telecommunications may also create its own subculture, quite separate from "mainstream" art. It may become an alternative cultural activity, whose purpose is to develop international and national projects on matters of mutual concern, and to explore questions of power and editorial authority in the electronic noosphere. Perhaps the most logical way of

expanding the field would be for each city-based group of telecommunication artists to work with local communities, to build local and national networks which could then be interfaced to international networks. Australia, in particular, with its vast distances between cities and its relative international isolation, has great potential for art networking.

The principal role of existing practitioners would then be to "switch" or to "interface" between local, national and international networks and projects, ensuring that a creative flow or exchange was maintained. One of the most important aspects of artists' use of telecommunications has been to obtain information about other accessible systems so that the work can expand into other electronic spaces. Artists in the future may be able to "download" and "upload" material from one communications system to another. Thus the concept of the artist as an interfacer, switcher or editor could take on a new significance.

HOW TO ACCESS THE "ARTEX" NETWORK

Artex is an artists' special interest group (SIG) within the I.P.Sharp "Mailbox" computer communication system. It uses the 666 ECS program to provide "profiled" accounts which simplify access and billing. (Prior to December 1983, the network was called "Artbox", and used other, specially-formulated programs.) It is simple to use, relatively cheap (about $30-$50 per month) and user-friendly. World-wide, there are about 20 regular users on the network, including galleries, universities and individual artists. (See Appendix III - 1986 directory of Artex users.)

I.P.Sharp is a Canadian company with offices in western Europe, North America, the Far East, and the eastern states of Australia. In Brisbane, Sydney, Canberra and Melbourne, the system can be accessed via a local call. It is also possible to dial in from any point in Australia via Telecom's Austpac service. The extra costs are absorbed by I.P.Sharp.

Messages are sent via a computer and modem, or a terminal attached to an ordinary telephone. This can even take the form of a small electronic portable typewriter and modem, costing about Aust.$500. However, dedicated (but expensive) terminals such as the Texas Instruments TI 745, GE Terminet or STC model 1100, are the simplest to use. On dialling the I.P.Sharp service number, a "high-low" tone is heard (300 baud, half-duplex operation). The user code (3-5 letters) may then be entered and messages sent. The central computer in Toronto stores the incoming messages until the recipient enters his or her user code and the messages can then be received, no matter where in the world the recipient happens to be (provided s/he can access the network). Charges are levied both for incoming and outgoing messages at about $2 per paragraph, irrespective of distance. It is also possible to skip unwanted messages. Although profiled accounts only allow "store and forward" operation, it is possible (but more

expensive) to have a general account which permits access to the 666 CONFERENCE system, which will allow live, "simultaneous" exchanges.

In order to access the Artex computer network, it is necessary to obtain a user number and code from the local I.P.Sharp office for a "profiled" ECS 666 account. This will take about 24 hours. The local office will also generally demonstrate the system and allow some "hands-on" practice. It is possible to use the company's terminals without incurring extra charges. I.P.Sharp will forward an account at the end of each calendar month, based on computer usage, rather than connect time or length of messages. This will probably be of the order of $30-$50. There are no standing charges - charges are made only for actual use of the system. At the end of every connection, the system prints out figures from which the cumulative total monthly charge can be estimated. Troubleshooters are available online via the STEW (steward - for system problems and queries) and MICRO (microcomputer problems) codes.

DIRECTORY OF ARTEX USERS

	Code
Adrian, Robert (Vienna, Austria)	RAX
Artcom (San Francisco, U.S.A.)	ARTTV
Ascott, Roy (Caerleon, Wales)	ASCOT
Collective Art+Technology (Toronto, Canada)	CATC
Centre for Media Art (Paris, France)	ENSAD
City Art Institute (Sydney, Australia)	CAISY
Cultural Software (Toronto, Canada)	CSOFT
Digital Art Exchange (Pittsburgh, U.S.A.)	DAX
Electric Bank (Des Moines, Iowa, U.S.A)	EBANK
Eric Gidney (Sydney, Australia)	OSSI
Hershmann, Lynne (California, U.S.A.)	LHE
Huotari (Vancouver, Canada)	METRO
Karlsson, Joakim (programmer)	JKA
Klinkowstein, Tom	TOMK
Langage Plus (Alma, Quebec)	PLUS
Lehrkanzel fuer Kommunikationstheorie, University of Vienna	LKT
Lobstein, Pierre, (France)	LOBS
Moser, Dana (Boston, U.S.A.)	MOSER
Open Space Gallery (Victoria, B.C., Canada)	APOLO
Paraffin-Tow Communications (San Francisco)	PTCM
Mobile Image (Santa Monica, California)	SHERI
Thomas, Paul (Perth, Australia)	SPACE
School of the Art Institute of Chicago	SAIC
University of Hawaii (Honolulu, U.S.A.)	UOH
Western Front (Vancouver, Canada)	FRONT
White, Norman T. (Toronto, Canada)	NTW
Microcomputer queries	MICRO
Steward (system queries)	STEW